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ABSTRACT

This revised and enlarged second edition gives notes on research and development activities related to programed instruction in Sweden. The notes include: (1) lists of research departments and publishers; (2) names and addresses of contact persons; (3) a list of programed study material; (4) bibliographies of books, articles, and research reports; and (5) notes on Swedish terminology. (Author/EMH)

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NOTES ON PROGRAMMED INSTRUCTION
IN SWEDEN

No. 5 January 1966
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NOTES ON PROGRAMMED INSTRUCTION IN SWEDEN

Second Edition

Abstract. - Notes on research and development activities related to instructional programming in Sweden are given, including (a) lists of institutions, organizations, and publishers engaged in instructional programming; (b) names and addresses of persons active in this field; (c) lists of programmed study material developed in Sweden; (d) bibliographies of books, articles, and reports within the field, written by Swedes and classified into three main groups: popular surveys, theoretical or methodological discussion, and empirical research; and (e) notes on Swedish terminology. In no case is complete coverage aimed at. The present notes represent a second (revised and enlarged) edition.

INTRODUCTION

It quite often happens that our department gets requests from individuals or institutes abroad to send some information about what has been and is being done in Sweden in the fields of programmed instruction and self-instructional study materials. In order to be able to answer such requests in a relatively satisfactory way without having to write a long letter each time, we have felt a need to compile and mimeograph some notes on current Swedish activities. We would like to emphasize that our primary motive in writing this report is this practical aim (you may call it our laziness), and we are neither able, nor do we find it very desirable to try to cover these activities completely. Hence, what follows should be considered as a sample of activities, names, and publications; we hope, however, that the sample is large and representative enough to give our colleagues abroad some useful starting points, if they want to make further contacts.

About forty letters were sent out in the process of collecting information for the first version of these notes. In the present second edition a number of minor changes have been undertaken both as a consequence of reactions from our readers and as a consequence of recent additions to the Swedish programming literature. We thank those of our friends and colleagues who have taken time to answering questions or commenting upon our first edition.

LIST A

CENTRES OF RESEARCH, DEVELOPMENT, PUBLICATION, AND EVALUATION OF PROGRAMMED INSTRUCTIONAL MATERIALS

A1. SOME CENTRES OF RESEARCH AND DEVELOPMENT

GÖTEBORG (GOTHENBURG)

Department of Education, University of Göteborg
Address: Mölndalsvägen 36, Göteborg S
Director of Dept.: Professor Kjell Härnqvist

Department of Educational and Psychological Research, Göteborg School of Education
Address: Övre Husargatan 34, Göteborg SV
Director of Dept.: Professor Karl-Gustaf Stukát

Institute for Programmed Instruction ("the IPU Institute")
Address: Skånegatan 29, Göteborg S
Director: Fil.lic. Lennart Parknäs

LINKÖPING

National School for Educational Research and Development
Address: Stenbrötsgatan, Linköping
Research director: Dr. Eve Malmqvist (Associate Professor at the University of Stockholm)

MALMÖ

Department of Educational and Psychological Research, Malmö School of Education
Address: Munkhättegatan 3, Malmö S
Director of Dept.: Professor Åke Bjerstedt

STOCKHOLM

The Army Section for Programmed Instruction
Address: Arméstabens utbildningsavdelning, Östermalmsgatan 87, Stockholm 90
Director of Sect.: Kapten Ragnar Ahrens

Department of Education, University of Stockholm
Address: Ynglingagatan 6, Stockholm VA
Director of Dept.: Professor Arne Trankell
Head, programming activities: Lektor Magnus Stiernborg

Department of Educational and Psychological Research, Stockholm School of Education
Address: Rålambsvägen 24, Stockholm K
Director of Dept.: Professor Torsten Husén

UPPSALA

Department of Education, University of Uppsala
Address: S:t Olofsgatan 12, Uppsala
Director of Dept.: Professor Wilhelm Sjöstrand
Head, programming activities: Dr. Karl-Georg Ahlström, Associate Professor

General note on Centres of Research and Development:
Most of the centres mentioned above are Departments of Education at Swedish Universities or Departments of Educational and Psychological Research at Swedish Schools of Education, which means that research and development activities in the field of programmed instruction is only one area of interest - among many others - for these departments. However, all departments mentioned above have been pursuing considerable programming research and/or development activities in recent years. The Institute for Programmed Instruction in Göteborg has a more exclusive orientation towards work in the programming field, and it is so far the only major centre of this type in Sweden. It is closely related to the Department of Education at the University of Göteborg. Whereas the Departments of Education at the Universities and at the Schools of Education have research and teaching as their major functions, the Institute for Programmed Instruction also accepts assignments from industries, organizations etc. on a commercial basis. The IPU-Institute is supported by the Hermods-NKI Correspondence School (Malmö).

A2. PUBLISHERS

There is at present no major publishing organization specializing exclusively in programmed instructional materials. Several publishers of school books, however, have issued a limited number of publications using programming techniques and have plans for extending this branch of activity. (Cf. list of study material below.) At present, however, there is only one publisher with a sizable number of titles approved for Swedish schools by the National Board of Education (cf. below, A3):

Svenska Bokförlaget
Address: Drottninggatan 20, Stockholm C
Editors, programming group: Mr. Ragnar Dahlkvist and others.

Among other publishers, actively engaged in publishing programmed materials, we may mention the following:

Almqvist & Wiksell/Gebers, Gamla Brogatan 26, Stockholm C

Biblioteksförlaget AB, Inedalsgatan 1, Stockholm

Bokförlaget Liber AB, Torsgatan 4, Stockholm C

Hermods-NKI, Slottsgatan 24, Malmö

SÖ-förlaget, Hantverkargatan 12, Stockholm K

The Institute for Programmed Instruction, Göteborg, listed above under A1, also functions as a publisher with regard to try-out editions and research reports.

Most Departments of Education at the Universities and Departments of Educational and Psychological Research at the Schools of Education issue their own series of mimeographed reports describing research and development activities in various fields. These series are usually distributed on a non-commercial basis and on a small scale, but you will sometimes get more information on development precedures, revisions and evaluations of programmed materials in these reports than you will from the commercial publishers. However, Swedish textbook publishers are aware of the need for manuals including

evaluational data, and such manuals are beginning to appear.

A3. ACTIVITIES OF THE NATIONAL BOARD OF EDUCATION

Most centres of development and research mentioned above under A1 consider evaluation of programmed materials as one of their major functions when developing programmed courses, and they have made several important contributions both to the methodology of evaluation and to the empirical revision work in connection with individual programs. In this sense, our centres of development and research are also centres of evaluation.

In addition, however, the National Board of Education (Skolöverstyrelsen) has boldly assumed the role of central evaluation agency for programs intended for Swedish schools:

National Board of Education (Skolöverstyrelsen)
Address: Hantverkargatan 25, Stockholm K
Persons to contact:
Dr. Nils-Eric Svensson, Assoc. Prof. of Education, Unit L4
Konsulent Åke Andersson, Unit UA3

In July 1964 the National Board of Education issued certain instructions on program development and program evaluation for distribution to Swedish publishers and programmers. The main point was that an official evaluation of programs intended for Swedish schools will be made by a unit within the National Board of Education (dealing with various teaching aids), and that the evaluation will be made in two main steps.

The first phase involves a study of the terminal goals of the program, an examination of program content by subject-matter experts, and some consideration of the development process, viz. making sure that some kind of preliminary empirical try-out, at least on a small number of students, has been made. Programs considered adequate in these respects are tentatively accepted, that is, they are accepted for use in Swedish schools for a maximal period of three years. In order to have the program accepted more definitely, however, the publisher or program constructor should - before the end of the three-year period - demonstrate to the satisfaction of the National Board that a more systematic empirical evaluation has been made, and that necessary revisions, if any, have been undertaken; a manual with all necessary information should also be available as should adequate terminal tests, defining the goals of the course in operational detail.

According to most recent information (June 1966), the National Board of Education has accepted 25 programs for the first, tentative 3-year period. Fourteen of these are published by Svenska Bokförlaget, seven by the Institute of Programmed Instruction, Göteborg, three by SÖ-förlaget and one by Liber. Of the 25 programs accepted, only one has been accepted for more than this first, tentative 3-year period.

Of course, 25 is not a large number (and some of the programs referred to are rather short). It is very probable that the mere existence of this evaluation agency has made the publishers reluctant to publish a flood of programmed texts. The central examining agency can therefore probably be said to have hampered rather than stimulated activity in this area, which may perhaps be an undesirable outcome from a certain

point of view; but, on the other hand, this has probably also had the good consequence of making publishers very aware of the demands on demonstrated quality. This may be an important factor in avoiding the high-speed over-commercializing of this field that we find in some countries. It should be added, perhaps, that the number of good programs in Sweden is higher than is indicated by the figure 25, for several reasons. For instance, programs for students above school age are as a rule not examined by the National Board of Education.

We now look forward with interest to seeing (a) whether or not the publishers will turn in the more systematic evaluation data required before the 3-year period ends, and (b) whether the initial holding-back of programs will be followed by a productive period of high-quality programs, or whether publishers will simply turn away from the field as something too difficult or economically too risky for them. Two years from now we will know at least part of the answers.

In order not to give the wrong impression that the National Board of Education has only had an examining and thereby perhaps "hampering" function within the field, it is only fair to add that the National Board, through its Bureau of Research and Development (headed by Dr. Nils-Eric Svensson), has also stimulated the development of self-instructional materials by means of research-and-development contracts with various research centres. At present, such developmental work is being carried out by research teams at several places, for instance, at the Departments of Educational and Psychological Research in Malmö and Stockholm and at the Department of Education in Uppsala. Only part of these materials can be characterized as programmed in a strict sence, but the principles of detailed goal analyses, objective terminal testing, alternating try-outs and revisions - typical characteristics of good programming - are used extensively also for materials that do not appear to be conventional programs.

LIST B

CONTACT PERSONS

Names and addresses of some of those active in the field and able to give further information on current activities in various areas of development:

Ahlström, Karl-Georg (Associate Professor of Education),
Department of Education, University of Uppsala, S:t Olofsgatan 12, Uppsala

Andersson, Åke (School Consultant),
National Board of Education, Hantverkargatan 25, Stockholm K

Bjerstedt, Åke (Professor of Education),
Department of Educational and Psychological Research, Malmö School of Education, Munkhättegatan 3, Malmö S

Dahlkvist, Ragnar (Editor),
Svenska Bokförlaget, Drottninggatan 20, Stockholm C

Dunlop, Ian (Director of Studies),
The British Centre, Kommendörsgatan 30, Stockholm Ö

Härnqvist, Kjell (Professor of Education),
Department of Education, University of Göteborg, Mölndalsvägen 36, Göteborg S

Jivén, Lars Magnus (Research Coordinator),
Department of Educational and Psychological Research, Malmö School of Education, Munkhättegatan 3, Malmö S

Malmqvist, Eve (Associate Professor of Education),
National School for Educational Research and Development, Stenbrötsgatan, Linköping

Parknäs, Lennart (Director of Programming Institute),
Institute for Programmed Instruction, Skånegatan 29, Göteborg S

Stiernborg, Magnus (Lecturer),
Department of Education, University of Stockholm, Ynglingagatan 6, Stockholm VA

Stukát, Karl-Gustaf (Professor of Education),
Department of Educational and Psychological Research, Göteborg School of Education, Övre Husargatan 34, Göteborg SV

Svensson, Nils-Eric (Associate Professor of Education)
Bureau of Research and Development, National Board of Education, Hantverkargatan 25, Stockholm K

Webb, John (Head, Language Laboratory Dept.)
Kursverksamheten, University of Stockholm, Grevturegatan 9, Stockholm Ö

LIST C

SOME PROGRAMMED STUDY MATERIALS PRODUCED AND AVAILABLE IN SWEDEN

Note. Subject-matter area is briefly indicated within brackets after the main Swedish title. Where relevant, grade level is also reported. - It might be added that the programs mentioned here differ very much in length - from extremely short ones (such as, for instance, the 16-page Mellgren program) to programs covering the total course of a school year (such as the IPU mathematics program for grades 7 and 8).

Dahlqvist, R. & Hilding, S. Procenträkningens grunder. /Mathematics: percentages, grades 6-7./ Stockholm: Svenska Bokförlaget, 1965.

Hemer, O. & Sander, N. Talföljder. /Mathematics./ Stockholm: Svenska Bokförlaget, 1966.

Holmberg, I., Holmberg, L., Jivén, L.M. & Svensson, J.-E. Statistiska grundbegrepp. En programmerad introduktion. /Introductory statistics for students of education and psychology./ Stockholm: Svenska Bokförlaget, 1964. (Rev. ed., 1966.)

Holmgren, S. Elementär redovisning. En programmerad lärobok i elementär bokföring med exempel från hantverks- och serviceföretag. /Introductory book-keeping./ Stockholm: Liber, 1965.

Howatt, A., Webb, J. & Knight, M. A modern course in business English. Stockholm: Folkuniversitetets förlag, 1965.

IPU. Matematik för högstadiet I-II. /Mathematics, grades 7-8./ Göteborg: IPU (mimeogr.), n.d.

IPU. Människan I: Fortplantning och fortplantningsorgan. /Biology: The human reproductive organs, grade 5./ Malmö: Hermods-NKI, 1966.

IPU. Ritningsläsning - att läsa och förstå maskinritningar. /Interpretation of machine drawings, vocational schools./ Stockholm: NKI-skolan, 1965.

IPU. Svensk språklära. /Swedish grammar, grade 6./ Göteborg: IPU (mimeogr.), 1963.

IPU. Trafikkunskap. /Traffic regulations, grade 9./ Göteborg: IPU, 1963.

IPU. Väderkartan. /The weather map, grade 9./ Malmö: Hermods-NKI, 1966.

IPU. Yrkesräkning I-III. /Mathematics, vocational schools./ Stockholm: SÖ-förlaget, 1966.

Mellgren, L. One and many. /English language, grades 6-7./ Stockholm: Svenska Bokförlaget, 1965.

Staflin, K. Grundläggande ellära för yrkesskolor. /Electricity, vocational schools./ Stockholm: Svenska Bokförlaget, 1966.

LIST D

SELECTED BIBLIOGRAPHY OF BOOKS, ARTICLES, AND REPORTS

D1. POPULAR INTRODUCTIONS OR GENERAL SURVEYS

Andersson, Å. Vad är programmerad undervisning?
Skolbiblioteket, 1965, 11, 209-217.

Bjerstedt, Å. **Programmed instruction** : A selective bibliographic guide.
Didakometry (Malmö: School of Education), No. 3, 1964. Pp. 14.

Bjerstedt, Å. Självinstruerande studiematerial: Selektiv bibliografi och ordlista.
Pedagogisk-psykologiska problem (Malmö: School of Education), No. 2, 1964. Pp. 28.

Bjerstedt, Å. Undervisningsmaskiner, språklaboratorier och gruppdynamisk kartläggning.
Lund: Gleerups, 1963. Rev. Ed., 1965. Chapter 1 (pp. 9-90).

Edfeldt, Å.W. Automatic teaching - principiella synpunkter.
Nordisk Psykologi, 1962, 14, 6-20.

Eklund, H. Det programmerade studiematerialets plats inom den obligatoriska skolan.
Pedag. Tidskr., 1963, 99, 145-154.

Gestrelius, K. Målinriktad vuxenutbildning. Lund: Uniskol, 1965. Chapter 7 (pp. 110-123).

Grundin, H.U. Programmerad undervisning.
Skolperspektiv, 1965, 2 (2), 22-26.

Hemer, O. & Sander, N. Något om självinstruerande hjälpmedel.
Elementa, 1964, 47, 27-33.

Husén, T. Inlärningsmaskiner och programmerade hjälpmedel.
Pedagogisk Debatt, 1962, 10, 48-57.

Husén, T. Programmerade hjälpmedel i undervisningen.
Kungl. Krigsvetenskapsakademiens Handlingar och Tidskrift, 1962, No. 1, 3-21.

Kylén, J.-A. & Stiernborg, M. Programmering i vuxenundervisningen.
Folkuniversitetet, 1964, 16, 10-16.

Malmquist, E. Undervisningsmaskiner och deras användning.
Skola och Samhälle, 1961, 42, 175-187.

Stiernborg, M. Ordförklaringar till några ofta använda termer inom programmerad undervisning.
Rapport, Arméstabens utbildningsavd. och Pedagogiska institutionen vid Stockholms universitet, No. 2, 1965. Pp. 23.

Stiernborg, M. Programmerad undervisning - en litteraturöversikt.
Rapport, Arméstabens utbildningsavd. och Pedagogiska institutionen vid Stockholms universitet, No. 1, 1965. Pp. 20.

Undervisningsmaskiner och programmerat studiematerial. Skolöverstyrelsen, Utredningar i skolfrågor 11, 1963. Chapters I-III (pp. 13-46.)

D2. THEORETICAL OR METHODOLOGICAL DISCUSSIONS

Bernmalm, S. Programmerad undervisning. En granskning och sammanställning av amerikanska forskningsrapporter. Göteborg: IPU, 1965. Pp. 80+60.

Bjerstedt, Å. Självinstruerande studiematerial. Lund: Uniskol, 1963. Pp. 243.

Bjerstedt, Å. Mapping the pheno-structure of didactic sequences. Didakometry (Malmö: School of Education), No. 1, 1964. Pp. 18.

Bjerstedt, Å. Utvärderingsprinciper för självinstruerande studiematerial. Pedagogisk-psykologiska problem (Malmö: School of Education), No. 3, 1964. Pp. 81.

Bjerstedt, Å. Mapping the effect-structure of self-instructional materials. Programmed Learning, 1965, 2, 99-109.

Bjerstedt, Å. Undervisningsprogrammering och utvärdering. Stockholm: Svenska Bokförlaget, 1965. Pp. 119.

Bjerstedt, Å. Phäno-Struktur und Effekt-Struktur didaktischer Sequenzen: Beiträge zur Analyse und Beurteilung von Lehrprogrammen. In: H. Frank (Ed.), Lehrmaschinen in kybernetischer und pädagogischer Sicht, IV. Stuttgart: E. Klett, 1966.

Björkman, M. Inlärningspsykologiska principer i programmerad undervisning - några frågetecken. In: Skolöverstyrelsen, Utredningar i skolfrågor 11, 1963. Pp. 96-105.

Stiernborg, M. Några "checklists" för bedömning av programmerat utbildningsmaterial. Rapport, Arméstabens utbildningsavd. och Pedagogiska institutionen vid Stockholms universitet, No. 3, 1965. Pp. 33.

Undervisning - konst eller teknik? (Mimeographed summaries from a conference, March 1966.) Göteborg: Dept. of Education, 1966.

D3. EMPIRICAL RESEARCH

Ahlström, K.-G. et al. Analys av effekterna av självinstruerande hjälpmedel i bilskolornas teoriundervisning. (Mimeogr. report.) Uppsala: Dept. of Education, 1965. Pp. 109.

Amcoff, S. & Ahlström, K.-G. SMID-projektet. Försök med självinstruerande material i tyst läsning för döva och hörselskadade. (Mimeogr. report.) Uppsala: Dept. of Education, 1966. Pp. 24.

Andersson, B.-E., Parknäs, L. & Wallin, E. Erfarenheter från ett försök med programmerad undervisning. Nordisk Psykologi, 1962, 14, 241-269.

Bratt, I. Engelska i språklaboratorium. Konstruktion och första utprövning av programmerat studiematerial för vuxenundervisning. (Mimeogr. report.) Lund: Dept. of Education, 1965. Pp. 42.

Holm, R. Immediate and delayed feedback during the exercise of verbal material.
Report, Department of Education, University of Uppsala, No. 19, 1964. Pp. 18.

Holmberg, I. Effekten av programmerad undervisning på vissa prestations-, attityd- och beteendevariabler, jämfört med konventionell undervisning.
Pedagogisk-psykologiska problem (Malmö: School of Education), No. 18, 1965. Pp. 71.

Holmberg, I. Programmed and conventional classroom instruction in arithmetic compared with respect to certain achievement, attitude, and behavior variables.
Didakometry (Malmö: School of Education), No. 4, 1965. Pp. 9.

Holmberg, I. A combination of programmed instruction and teacher-supervised small group instruction compared with conventional classroom method.
Didakometry (Malmö: School of Education), No. 10, 1966. Pp. 13.

Holmberg, I. Maskinundervisning kombinerad med lärarledd smågruppsundervisning, jämfört med konventionell undervisning.
Pedagogisk-psykologiska problem (Malmö: School of Education), No. 30, 1966. Pp. 56.

Jansson, A., Månsson, H. & Nordman, E. Programmering av geometriavsnittet i grundskolans fjärde årskurs samt undersökning huruvida programmerad undervisning i geometri är lämplig på detta åldersstadium. (Mimeogr. report.)
Uppsala: Dept. of Education, 1963. Pp. 46.

Jivén, L. M. & Svensson, J.-E. Programmerad undervisning i elementär pedagogisk statistik.
Pedagogisk-psykologiska problem (Malmö: School of Education), No. 6, 1964. Pp. 48.

Jivén, L. M. & Svensson, J.-E. Erfarenheter från programmerad undervisning i statistik.
Pedagogisk-psykologiska problem (Malmö: School of Education), No. 32, 1966.

Lane, G. Erfarenheter av ett försök med programmerad undervisning i matematik.
Rapporter från Pedagogiska institutionen, Göteborgs universitet, 1963. Pp. 38.

Malmqvist, E. Preliminär utprövning av några undervisningsmaskiner (Ch. IV). Redogörelse för tillvägagångssättet vid konstruktion av några program (Ch. V).
In: Skolöverstyrelsen, Utredningar i skolfrågor 11, 1963. Pp. 47-95.

Malmqvist, E. Undervisningsmaskiner och programmerat studiematerial.
Svensk Skolledartidning, 1963, 22, 130-145.

Stukát, K.-G. Ett försök med programmering av svensk språklära.
Stockholm: Biblioteksförlaget, 1963. Pp. 44.

Stukát, K.-G. Construction and field testing of a grammar program.
Programmed Learning, 1965, 2, 14-30.

Stukát, K.-G. Ett experiment rörande kännedom om resultatet och stegstorlek i ett språkläreprogram.
Pedagogisk Forskning, 1965, 9, 93-102.

Svingby, G. Inverkan av fixerade kunskapsmål på tidsfaktorn i olika typer av individuell undervisning. (Mimeogr. report.)
Göteborg: IPU, 1965. Pp. 38.

Svingby, G. Rapport över fortsatt utprövning av ett undervisningsprogram i matematik. (Mimeogr. report.)
Göteborg: Dept. of Education, 1965. Pp. 47.

Wiksten, S. & Eriksson, B. En studie av elevstyrd undervisning. (Mimeogr. report.)
Göteborg: Dept. of Education, 1965. Pp. 39.

LIST E

A SHORT LIST OF SWEDISH TERMS WITH APPROXIMATE ENGLISH EQUIVALENTS

Only a very brief introductory list of selected terms is given; we hope to publish a more complete annotated list later on.

SWEDISH	ENGLISH
Beteendemål	Behavioral objective
Borttoning	Fading
Didaktogram	Didactogram (cf note 1)
Didul	Didule (cf note 2)
Formella stödstimuli	Formal prompts
Förgreningsteknik	Branching technique
Förstärkning	Reinforcement
Icke-observerbar reaktion	Covert response
Informationstäthet	Information density
Intermediära processer	Intermediate processes
Labyrintbok	Scrambled book
Linjeprogrammering	Linear programming
Målanalys	Goal analysis
Målpopulation	Target population
Observerbar reaktion	Overt response
Program	Program
Programmerad undervisning	Program(m)ed instruction
Programmerare	Program(m)er
Ram	Frame (cf note 2)
Resultatåterkoppling	Feedback of results
Sektion	Panel (cf note 3)
Sekvens	Sequence
Sidomaterial	Panel (cf note 3)
Självinstruerande metoder	Auto-instructional methods
Steg	Step
Stimulus	Stimulus
Stödstimulus	Prompt
Svarskrav	Response request
Svarsreaktion	Response (answering behavior)
Taktstyrning	Pacing
Tematiska stödstimuli	Thematic prompts
Terminalbeteende	Terminal behavior
Terminalprov	Terminal test
Undervisningsmaskiner	Teaching machines
Återkopplingsteknik	Feedback technique

Notes to the terminological list:

The terminology in Swedish is not settled as yet. Some of the existing Swedish terms have no direct counterpart in English and have been developed independently. Some of the current English terms (e.g., frame and panel) have been used in various ways by different English-language writers, and Swedish terms are in some of these cases more precise (cf comments below).

Note 1
A "didactogram" is a diagram (sometimes used during the empirical try-out process) depicting the passage of one or more students through a programmed study-material (usually a course with some kind of branching involved). On a basic symbol chart of the program and its various routes we enter information on frequency of use (of the various tracks) and on correctness of behavior (within the separate didules).

Note 2
The English term frame is used in two different ways: (a) to refer to an educational micro-unit (the program's contribution to the smallest interaction between program and student, usually consisting of three components: information, response request, and feedback); and (b) to refer to a presentational micro-unit (what the student is presented from the program - sees or hears - at a particular moment).

For the first use (a) the Swedish term "didul" has been proposed and used (in English language reports from Sweden this term has been given in English as "didule"). For the second use (b) the Swedish term "presentationsenhet" has been proposed and used ("presentational unit"). However, the direct translation of frame as "ram" has also been used in Sweden. But I feel that this should be avoided in more strict discussions, not only because of the ambiguity (the two meanings referred to), but also since it tends to focus the thoughts on a specific type of presentation unit (i.e., the small-size visual window as seen in some of the conventional teaching machines). It does not fit very well - neither in English, nor in Swedish - together with other types of presentation units (e.g., the auditive ones in a foreign language program). It might be added that in certain cases a "didule" and a "presentational unit" may coincide, but usually they do not. Most often one didule consists of at least two presentational units.

Note 3
The English term panel is used in two different ways within programming: (a) to refer to the parts (or "levels") of a page of a programmed textbook, usually divided by horizontal lines; and (b) to refer to additional presentational materials that the student is sometimes referred to in working through a program, e.g., tables, brief texts, maps, etc. In Swedish we use "sektion" ("section") for meaning (a); and "sidomaterial" ("side materials") for meaning (b).

REPRINT SERIES:

1. Bjerstedt, A. Skolorienterad beteendeforskning vid lärarhögskolan i Malmö. (Ur: Nordisk Psykologi, 1965.)
2. Bjerstedt, A. Pedagogiskt utvecklingsarbete i främmande språk. (Ur: Skola och Samhälle, 1965.)
3. Jivén, L. M. Undervisningsväsendet i Sovjetunionen. (Ur: Skola och undervisning . . ., 1965.)
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